Hyomuk Kim

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INTERESTS

Robotics, Navigation, Computer Vision, Machine Learning

EDUCATION

Chung-Ang University   Seoul, Republic of Korea
Undergraduate Student   *Mar 2007 – Feb 2011*

- B.Sc. in Electrical and Electronics Engineering
- Cadet in the Army ROTC program (49th)

RESEARCH EXPERIENCES

Robot Intelligence Team, Robot Center, Samsung Research   Seoul, Republic of Korea
Staff Software Engineer (Advisor: Junghyun Kwon)   *Apr 2021 – Present*

Project: **Autonomous Mobile Robot Indoor Navigation**

- Designed the architecture of visual SLAM module using ROS2 with C++ for our navigation suite and implemented ORB feature extractor and matcher for visual odometry and local bundle adjuster for optimization of local map.
- Examined LiDAR scan based Monte-Carlo localizer module and refactored motion model and measurement model by testing the localizer module on robots of various types and ensuring improved performance.
- Adjusted cost function of Dynamic Window Approach of forward motion planner according to the configurations of robots and tuned parameters to handle problematic situations that robots are faced with.

Global AI Center, Samsung Research   Seoul, Republic of Korea
Software Engineer (Advisor: Daniel D. Lee)   *Jan 2020 – Apr 2021*

Project: **Mind Reading User Interface**

- Implemented speech recognition engine with EEG and hand gesture recognition engine with EMG using boards and sensors of OpenBCI and Bitalino by collecting data according to proper paradigms and protocols, applying signal encoding with CNN models and conducting experiments for performance evaluation.

Project: **Voice Command Recommendation for AI Assistant**

- Developed Android application to demonstrate a recommendation engine by analyzing planning rules of AI assistant and implementing an algorithm to catch up with contexts of using mobile phone with TF-IDF for real-time logs of touch interface and voice command.

Language & Voice Team, Global AI Center, Samsung Research   Seoul, Republic of Korea
Software Engineer (Advisor: Chanwoo Kim)   *Apr 2018 – Jan 2020*

Project: **Efficient Text-To-Speech Synthesis**

- Implemented partially, optimized and benchmarked deep generative models such as WaveNet, parallel WaveNet, WaveRNN and LPCNet, while training in parallel with multilateral hyper-parameter tuning and assessing the models by MOS(Mean Opinion Score) to improve performance.
- Collected and preprocessed raw data consisting of voice and script to secure the refined dataset to be utilized for training and validation.
- Made contributions for commercialization of Neural TTS engine into mobile devices.

PROFESSIONAL EXPERIENCES

TV R&D Lab., Visual Display Div., Samsung Electronics   Suwon, Republic of Korea
Hardware Engineer   *Apr 2013 – Apr 2018*

- Participated in projects on commercialization of TV products annually released.
- Measured and analyzed elements of picture/sound quality, electro-magnetic interference (EMI), wireless connection (Wi-Fi/Bluetooth), DC power sequence and device compatibility to troubleshoot problems of TV system.
- Reviewed layouts of product components, managed circuitry modifications, applied design changes on CAD program and coped with various tasks for production of PCBs and overall bring-up process.

C-Lab., Visual Display Div., Samsung Electronics — Suwon, Republic of Korea

Project Leader — *Jun 2014 – Jun 2015*

- Led a project (made up of 6 members) on implementation of user contents archive application on TV system.
- Concretized service concept, designed information architecture and graphical user interface and realized flexible user experience for sharing user contents between multi devices or broadcasting them between users via a channel.

**Reconnaissance Battalion**, 60th Div., Republic of Korea Army — Goyang, Republic of Korea

First Lieutenant, Head of Communication Platoon — *Mar 2011 – Jun 2013*

- Responsible for strategic operation of communication systems, managed military radio, antenna and information assets and provided training to members as a communication director of Battalion.

PATENTS

[1] Eunsoll Chang, Youngil Koh, **Hyomuk Kim**, Mideum Choi.
Movable Robot And Controlling Method Thereof. *US18/142928, May 2023.*

[2] **Hyomuk Kim**, Aron Baik.
Robot, Robot System And Controlling Method Thereof. ◉ *WO2023063565A1, Apr 2023.*

[3] Mideum Choi, **Hyomuk Kim**, Jewoong Ryu, Aron Baik.
Electronic Device And Control Method Therefor. ◉ *WO2023043075A1 (filed to US Patent), Mar 2023.*

[4] Soonbeom Kwon, Aron Baik, Dohoon Kim, **Hyomuk Kim**, Hyunki Hong.
Robot And Control Method Thereof. ◉ *WO2023003158A1, Jan 2023.*

[5] **Hyomuk Kim**, Woojeong Kim, Jewoong Ryu, Mideum Choi, Aron Baik.
Robot Device Operating In A Mode Corresponding To A Position Of The Robot Device And Control Method Thereof. *KR10-2022-016584 (filed to US Patent), Dec 2022.*

[6] Keunseok Cho, Dongseop Lee, **Hyomuk Kim**, Yusun Son, Dojun Yang, Ziwon Hyung.
Electronic Device And Control Method Therefor. ◉ *WO2022186580A1, Sep 2022.*

[7] Dongseop Lee, Ziwon Hyung, **Hyomuk Kim**, Dojun Yang, Keunseok Cho.
Electronic Device And Control Method Therefor. ◉ *WO2022080659A1, Apr 2022.*

[8] Dongseop Lee, **Hyomuk Kim**.
Electronic Device And Control Method Therefor. ◉ *WO2022050644A1, Mar 2022.*

[9] **Hyomuk Kim**, Seongjin Park, Soyoon Eo, Seungyeon Jeong, Yeonseok Choi, Taehun Kang, Hyejeong Lee, Kwanmin Lee.
Display Apparatus And Control Method Thereof. ◉ *US20170026528A1, Jan 2017.*

COURSES

Nanodegree in Robotics Software Engineer, Udacity — *Online*

◉ Certificate — *Sep 2021 – Dec 2021*

The Complete Self-Driving Car Course - Applied Deep Learning, Udemy — *Online*

◉ Certificate — *Jan 2022 – Mar 2022*

AWARDS & HONORS

Super Rookie Project Award, Ranked 2nd Prize, Samsung Electronics — *Apr 2014*

- For presenting an outstanding TV service concept of user contents archive platform with flexible interfaces.
- With the prize, my team got a chance to work on the project in C-Lab. (It is a great honor for rookies!)

Volunteer Scholarship, Chung-Ang University — *Spring 2009*

Special Scholarship, Chung-Ang University — *Fall 2009*

Chung-Ang Love Scholarship, Chung-ang University — *Spring 2009, Fall 2009, Spring 2010*

SKILLS

Languages: Korean (Native), English (Fluent)

Programming: C/C++, Python

Technologies: Linux, ROS/ROS2, OpenCV, Ceres, Eigen, Tensorflow, Keras, Git, LaTeX